# RELIABILITY & SECURITY

Workshop - Portland, Oregon

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WECC

# Risk Register & 2024 Western Interconnection Risk Report

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# Agenda

- What is the Risk Register?
- Why have a Risk Register?
- How is the Risk Register maintained?
- Who can participate?
- When is involvement needed?

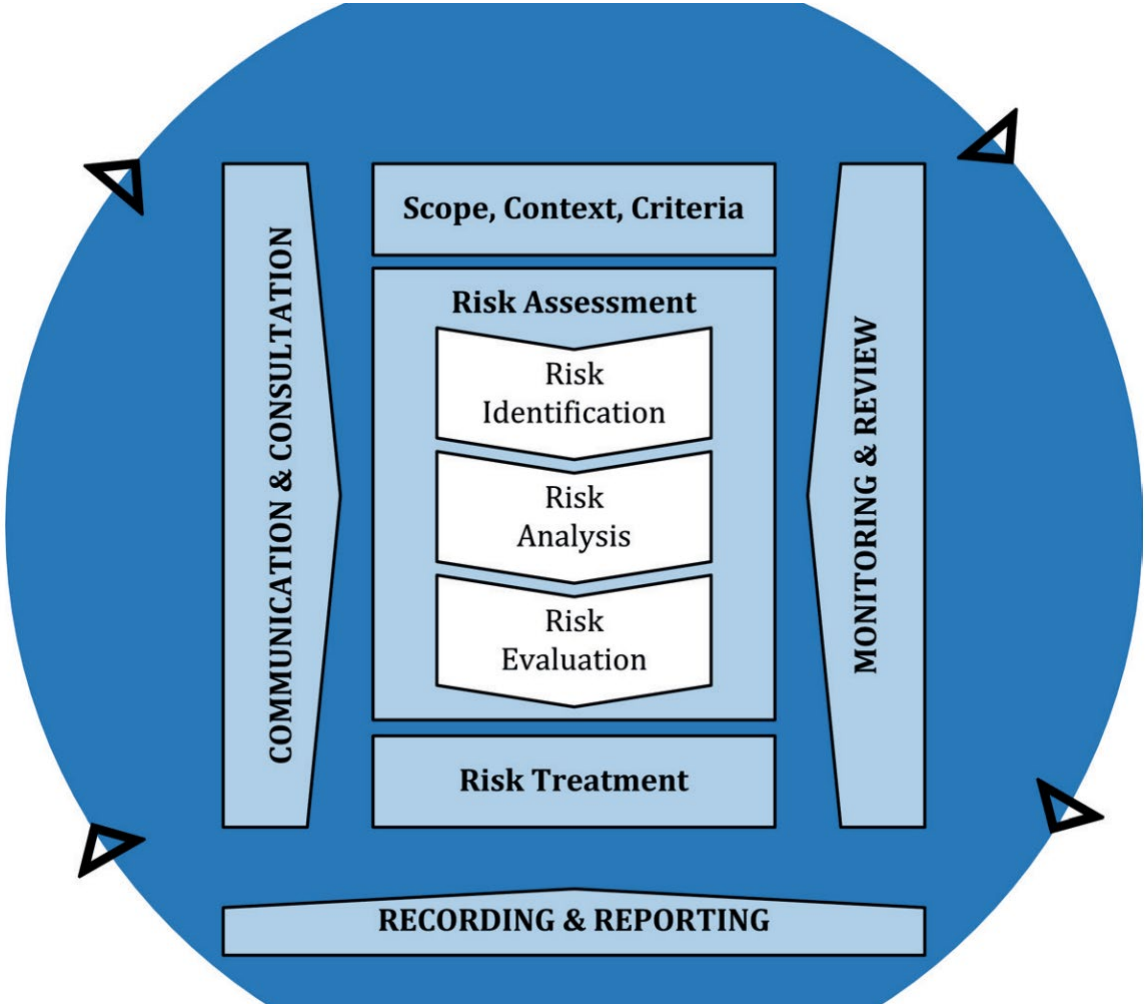
# What's In it for Me?

May affect compliance monitoring

Should inform entity-level risk analysis processes

# What is the Risk Register?

- Using a formal Risk Management Process
- Based on ISO 31000 Risk Management Process
- Identify the top risks facing the Western Interconnection



# Risk Analysis Overview

**Risk analysis:**

- Risk statement:
  - *Condition*
  - *Consequence*
  - *Cause*
- Impact and likelihood estimate
- Timing of risk
  - Timing *(1 year, 5 years, 10 years)*
  - Velocity *(time to manifest)*
  - Trending *(increasing/decreasing)*

| Reliability Risk Matrix | | | | | | |
|---|---|---|---|---|---|---|
| Consequence/Impact (C) | | Likelihood (L) | | | | |
| | | L1 | L2 | L3 | L4 | L5 |
| | | Very Unlikely | Unlikely | Possible | Likely | Almost Certain |
| C5 | Severe | Medium | High | High | Extreme | Extreme |
| C4 | Major | Medium | Medium | High | High | Extreme |
| C3 | Moderate | Low | Medium | High | High | High |
| C2 | Minor | Low | Low | Medium | Medium | High |
| C1 | Negligible | Low | Low | Low | Medium | Medium |

| Consequence/Impact—How could a typical event due to this risk effect BPS Reliability? | |
|---|---|
| Severe (C5) | Impacts may have widespread effects to the BPS across North America. |
| Major (C4) | Impacts may have widespread effects to the RC area. |
| Moderate (C3) | Impacts may have widespread effects to portions of the RC area. |
| Minor (C2) | Impacts may have effects on the local entity. |
| Negligible (C1) | Impacts may have small or non-existent effects to the BPS. |

# Risk Register

Toolbox section of WECC.org, under [Western Interconnection Risk Management Program]

# Risk Categories

- Cybersecurity
- Extreme natural events
- Grid transformation
  - Changing resource mix
  - Inverter-based resources
  - Resource adequacy
- Infrastructure
- Personnel
- Physical security
- Other

# Top Risk: Large and Prolonged Heatwaves

**Category: Extreme Natural Events**

- **Condition**: Prolonged heatwave events stress the interconnection as BAs ensure there is enough generation to meet the demand and transmission available to transfer it. The impact can also be more significant depending on the size of the heatwave.
- **Consequence**: As experienced in 2020 and 2022 heatwaves, prolonged high temperatures affect transmission availability and all classes of generation. As the ambient temperature rises, derates will occur for transmission and generation thermal ratings, causing a lack of transmission and generation availability.
- **Cause**: Beyond our control

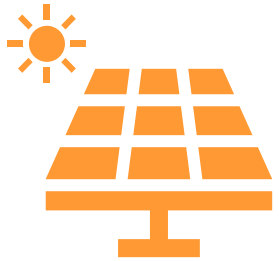
**Assessment: Extreme**

# Top Risk: Performance and Validation Issues

**Category: Grid Transformation—Inverter-based Resources**

- **Condition**: Lack of studying the actual performance of inverter-based resources and validating is not being performed by applicable entities to avoid large-scale outages and to address systemic performance issues.
- **Consequence**: Multiple large-scale disturbances on the bulk power system have resulted in the abnormal performance of inverter-based resources across several generating resources. These disturbances have exhibited systemic performance issues that have caused unexpected losses of inverter-based generation, with the potential to cause widespread outages.
- **Cause**: Few inverter-based Generator Owners are conducting performance validation activities to validate how the generating facility responds to grid disturbances with a suitable and expected performance.

**Assessment: Extreme**



# Top Risk: Applicability of GO Registration and NERC Reliability Standards

**Category: Grid Transformation—Inverter-based Resources**

- **Condition**: Generating resources using inverter-based resources may not be required to follow some or all the NERC Reliability standards.
- **Consequence**: As generating facilities using inverter-based resources may not follow some or all of NERC's applicable standards, the impacts currently experienced by these devices will continue to increase as the number of facilities continues to grow.
- **Cause**: An increasing number of generating resources using inverter-based resources are below the NERC criteria to register as a Generator Owner and are not required to follow the NERC Reliability Standards. In addition, inverter-based facilities that do register may not have to follow all the applicable standards that other generating facilities must as the language in the standards may not account for this technology.

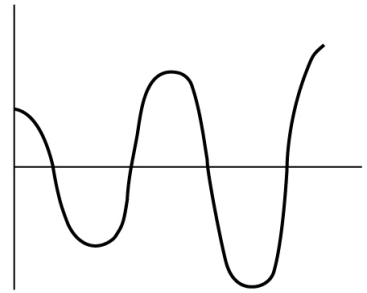
**Assessment: Extreme**

# Top Risk: Forced Oscillations from Battery Energy Storage Systems

**Category:** Grid Transformation—Inverter-based Resources

- **Condition**: As more IBRs are added to the Western Interconnection, the industry is seeing them generate oscillations, some that resonate at or near the known natural modes of the system. If the system is stressed, a forced oscillation could cause instability of the grid.
- **Consequence**: Forced oscillations can cause transmission facility overloads, generator instability and other reliability issues that could lead to facility damage, islanding and other extreme reliability issues.
- **Cause**: Incorrect inverter settings can dramatically cause real power oscillations that are made more problematic due to the type of related facility and the programmability of its control systems.

**Assessment:** Extreme



divergent oscillation

# Top Risk: Drought (Aridification)

**Category: Extreme Natural Events**

- **Condition**: Severe and extended drought conditions.
- **Consequence**: Reduction in the availability of some hydro resources in the West and limiting the cooling capacity of thermal generation.
- **Cause**:

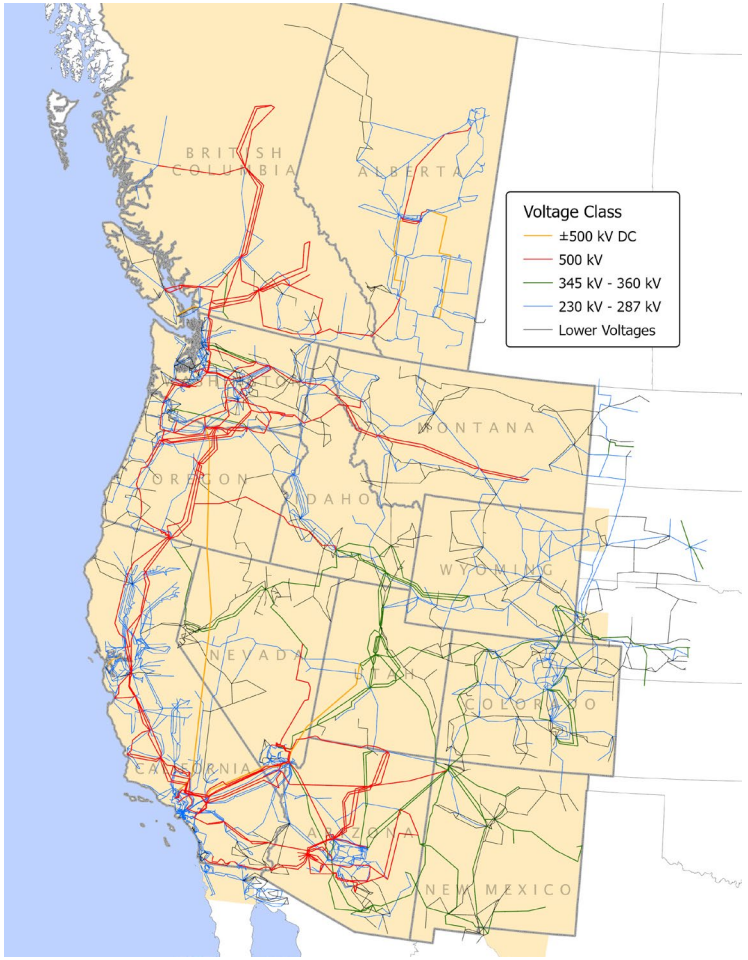
**Assessment: High**

# Risk Register Evolution

- 46 risks identified (15 recent additions)
- New risk proposals welcome any time
  - Initiation Form (QR Code ->)
- Treatment plans
- Assess effectiveness

# Regional Evolution

- Western Interconnection-wide




- Western Interconnection Regions

# Risk Appetite (Tolerability)

Typical appetite: extreme/high must be reduced to medium or lower

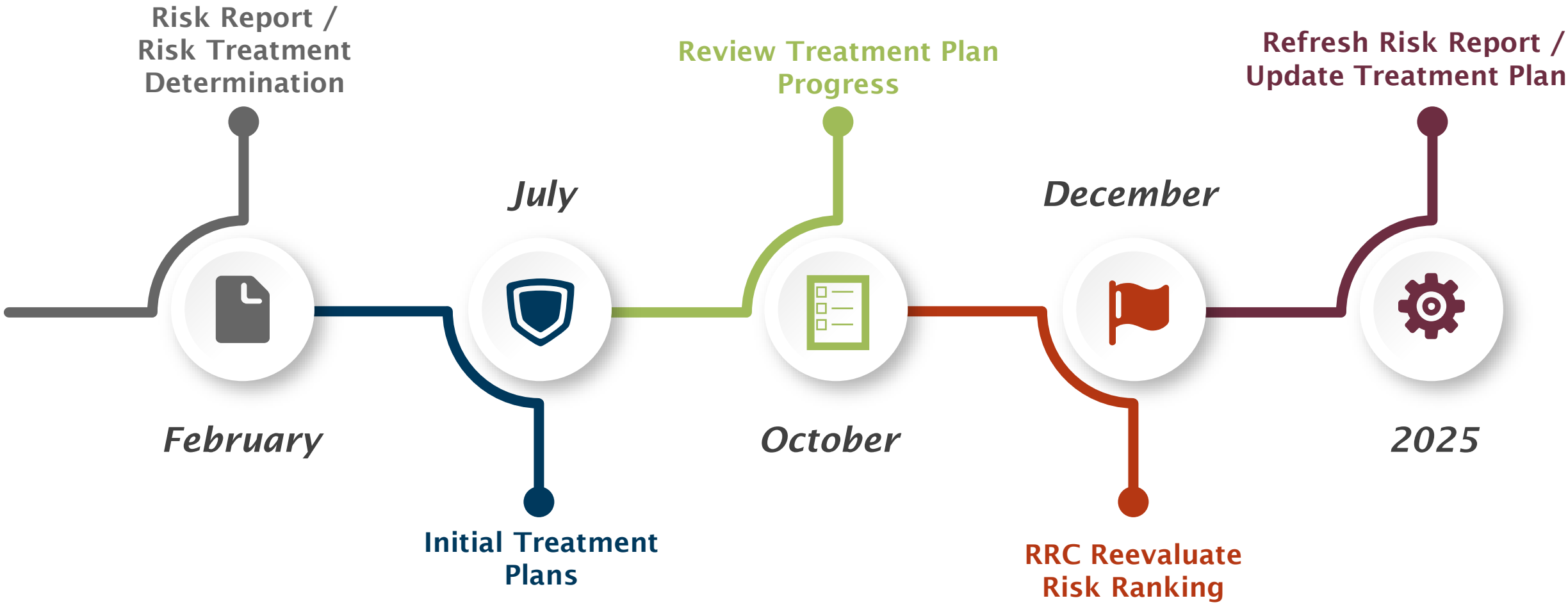
Most risks are debated for mitigation regardless of ranking (this sets an informal appetite)

RRC can formally or informally determine tolerability

# Risk Treatment Options

- **Accept:** retain the risk by making an informed decision. Taking or increasing the risk to pursue an opportunity. This includes acceptance of the current activities addressing the risk.
- **Reduce:** further action is required to remove the risk source; change the likelihood; or change the consequences.
- **Transfer:** sharing the risk (e.g., buying insurance, efforts led by others).
- **Avoid:** avoid the risk by deciding not to start or continue with the activity that gives rise to the risk.
- **Blank:** further analysis acknowledgement.

# 2024 RRC Timeline of Work



# 2024 Western Interconnection Risk Report

- Report (QR Code ->)
- Initial 31 registered risks
- Inherent risk ranking
- Serves as a snapshot of the historical 2024 risks
- Allows tracking of future progress
- Risk Register will remain dynamic

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Electric Reliability and Security for the West

www.wecc.org